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The Director of Central Intelligence
Washington, D.C. 20505

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National Intelligence Council

[Redacted] 9 October 1984

MEMORANDUM FOR: Director of Central Intelligence
Deputy Director of Central Intelligence

THROUGH: Chairman, National Intelligence Council
Vice Chairman, National Intelligence Council

FROM: Julian C. Nall
National Intelligence Officer for Science and Technology

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National Intelligence Officer for Warning

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Chairman, Scientific and Technical Intelligence Committee

SUBJECT: Technology Surprise

1. This memorandum is for your information.
2. The term "technology surprise" is often used to describe a wide variety of warning failures. Just as in "surprise attack" we must disassemble the problem and deal pragmatically with the component parts. The history of warning is replete with instances of surprise, most of which were not the result of insufficient data but rather fuzzy reporting, incomplete synthesis and analysis, or most commonly, refusal or inability to act upon the warning. There is little difference in dealing with the problem of technology surprise, except that often the time-line of events is more prolonged and the immediate consequences not so fatal as military attack or war. Nonetheless, the consequences of technology surprise can be very serious in terms of impact on our national security.
3. Two types of technology surprise can be addressed: the sudden advance in applied science or technology which for some period provides an adversary with an economic or military advantage; and the application of some known technology in an unusual and innovative manner. In our opinion the likelihood of the first of these classes is low but the effect potentially dramatic. In recent years the Soviet use of mycotoxins in chemical agents is

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an example of this class of surprise. In earlier times the development of nuclear weapons and the transistor clearly fall into this category. Future surprises might include a new, practical energy source and new products from biotechnology. One must be continually alert to a "keystone" technology which when added to existing ones will have a major impact. The magnetron was such an example in the development of radar.

4. The second type, "surprise based on known technology" is more likely but the consequences equally dramatic. One example was the development of the Alpha-class submarine.

This type of surprise might result from different cultural values and processes which often lead our scientists and engineers down disparate paths. One must be concerned about what may be lurking where the Intelligence Community has not focused attention.

5. We believe there is no single way by which early warning of technology surprise can be provided. The only way that the problem can be attacked appropriately is in a multifaceted manner such as done in other forms of warning. There must be a structured review of all sources of information, including overt, for pertinent indicators; indicator information should be reviewed against a representative set of possible scenarios; and the entire development viewed in the context of the total situation political, military, and economic, which might influence decisions and policy direction. Problems of perception and misperception, mirror imaging, mind sets, etc., pertain to all. There are many ways which should individually or collectively provide indicators of foreign activity which might lead to surprise, and all must be exploited.

6. Much is now underway within the Intelligence Community which is directly or indirectly addressing the two types of surprises. At the scientific level where early indication of the technology surprise may first show up, there are three significant Intelligence Community programs which are applicable. They are:

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-- the worldwide assessment of certain key areas of sciences sponsored by the President's Science Advisor.

7. At the technology level there are numerous activities which in one way or another address the surprise issue. They include:

-- Portions of the program of IC components are devoted to the surprise problem with emphasis, however, on surprise based on known technology. A Soviet perspective is emphasized to the greatest extent possible.

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-- [redacted] is devoted to projecting future technologies and weapons.

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- Frequent interaction with R&D managers in both government and industry to assure that promising emerging technologies in the US are known to the Intelligence Community. Assessment of similar Soviet activity or counters to it is well known "mirror imaging" but is part of any effort to prevent surprise.
- Exploitation of special material to search for emerging Soviet technologies, especially those which differ from the Western approach.

8. There are additional activities that should be emphasized to assure a reduced probability of surprise. We have been or are jointly setting in motion the following:

- Increased IC involvement with and support [redacted] any similar effort to assess Soviet applied sciences.
- More IC collection and analysis in gaps as identified [redacted] including recognition that in addition to the questions of what may take place, the importance of when it will happen.
- Increased attention to areas where Soviets are known to be ahead or are taking a different approach including technologies which the US may have rejected or abandoned but possibly emphasized by the Soviets and attention to Soviet approaches which may be different to get around weaknesses in technology.

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- More frequent interaction with external young scientists who are doing unusual research including sponsoring their participation in panels like STAP.

9. We plan to sponsor jointly the following:

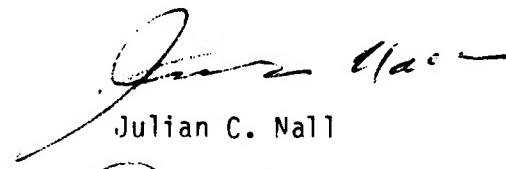
- Small colloquia on specific S&T subjects. The objective will be to identify the full range of Community concerns in important areas of developing technology like sensors, optical processing and computing, and genetic engineering. A short summary report will result from each colloquium.
- A small colloquium on the evidence for technology advances of low probability in the Soviet Union but with potentially dramatic impact if successful.
- Regular sessions with the S&T Principals of the IC on the early warning issue.

10. NIOs are not responsible for organization of IC resources, however, we suggest that there should be a small dedicated group of persons in many if not all of the components of the IC which is focused exclusively on the surprise problem, especially the possible sudden advance in applied science or technology. These persons would have to work closely with the academic community, the various collectors of overt material, and the clandestine services. They must recognize that outside expertise may not help too much in areas where the Soviets are ahead or are planning entirely different approaches. The members of the group must be protected from all current intelligence and most demands of a day to day nature. The management of the component would have to be especially concerned to prevent proponents of a given advance from becoming less than objective. At the same time, top management would have to assure that the careers of such individuals are not sidetracked and that the postulated advances which they might discuss are not "laughed at." By close association with the academic community the possible advances studied by the group would never include those which are not allowed by the laws of nature.

11. For surprise based on known technology, we do not believe it necessary to form any special groups even though we believe the effort being applied in the present organizations is insufficient. As indicated above, certain components of the Community should be encouraged to enhance considerably their efforts toward the avoidance of surprises based on known technology.

12. This memorandum has addressed the early warning problem with respect to the Soviet Union. We recognize that the importance of surprise in the PRC or certain free world countries is great and that it should be addressed in future work of the NIO for S&T, the NIO for Warning and the Chairman, STIC.

13. Your support of these planned activities will be important to us and we will keep you informed as progress is made.


Julian C. Nall


David Y. McManis



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